How this investigation fits within the “Concept and Lesson Map”:

**Overview for Unit 2**

“To understand the Earth’s spherical shape and basic ideas about gravity, students use models, gather evidence from images, and discuss interesting thought experiments. They deconstruct the common misconceptions about Earth’s shape, gravity, and air, and what causes the sensation of weightlessness. Students “journey” to the moon through a series of images from the Apollo 11 Mission, using evidence from images to discuss, and write about concepts presented in Units 1 and 2.” (GEMS, Space Science Sequence, Introduction, Science Background, Assessment Scoring Guides, page 8)

Overarching question(s) for this whole investigation:

* What shape is the Earth?
* What does gravity do?

**Attending to “How People Learn”**

How People Learn Key Finding #1: Preconceptions

Eliciting Students Ideas:

Pre-Unit 2 Questionnaire, Session 2.1 Student Sheet: “The pre-unit questionnaires allow teachers to gather information about their students’ possible misconceptions and current understandings of the key concepts in the unit.” See Scoring Guide pages 74-77.

Common Student Preconceptions:

Guidebook for entire kit from GEMS Space Science Sequence, Background, page 31-33.

How People Learn Key Finding #2: Facts/Concepts/Knowledge

WA State Content Standards “Science Domains” (EALR 4):

* **4-5 ES1A** Earth is approximately *spherical* in shape. Things on or near the Earth are pulled toward Earth's center by the *force* of *gravity*.
* **4-5 PS1A** The *weight* of an object is a measure of how strongly it is pulled down toward the ground by *gravity*. A spring scale can measure the pulling *force*.

WA State Content Standards “Science Domains” (EALRs 1-3):

* **4-5 INQA —Question—** Scientific *investigations* involve asking and answering *questions* and comparing the answers with *evidence* from the real world.
* **4-5 INQF —Models—** A scientific *model* is a simplified representation of an object, event, *system*, or process created to understand some aspect of the *natural world*. When learning from a *model*, it is important to realize that the *model* is not exactly the same as the thing being modeled.
* **4-5 INQG —Explain—** Scientific explanations emphasize *evidence*, have logically consistent arguments, and use known scientific *principles, models*, and *theories*.

How People Learn Key Finding #3: Metacognition

Metacognition: How did my thinking change? What caused the change? How did I come to believe this?

* The post-unit questionnaires allow teachers to gather information about how students’ ideas and understandings have changed during the unit and to measure progress in students learning. See Post-Unit Questionnaire, Session 2.6 Student Sheet, and Scoring Guide pages 78-81. See *Taking the Post-Unit Questionnaire,* page 350.
* See Guidebook for entire kit from GEMS Space Science Sequence, meaning-making discussions, writing prompts and evidence circles.

Evidence of Student Understanding:

Pre and Post Questionnaires, Session 2.1 Student Sheet and Session 2.6 Student Sheet, Scoring Guides pages 74-81.

**Additional Information**

See Teacher Considerations sections (odd numbered pages throughout unit).

Materials and Student Management

See Teacher Considerations sections (odd numbered pages throughout unit).

Timing Considerations

See Teacher Considerations sections (odd numbered pages throughout unit).